



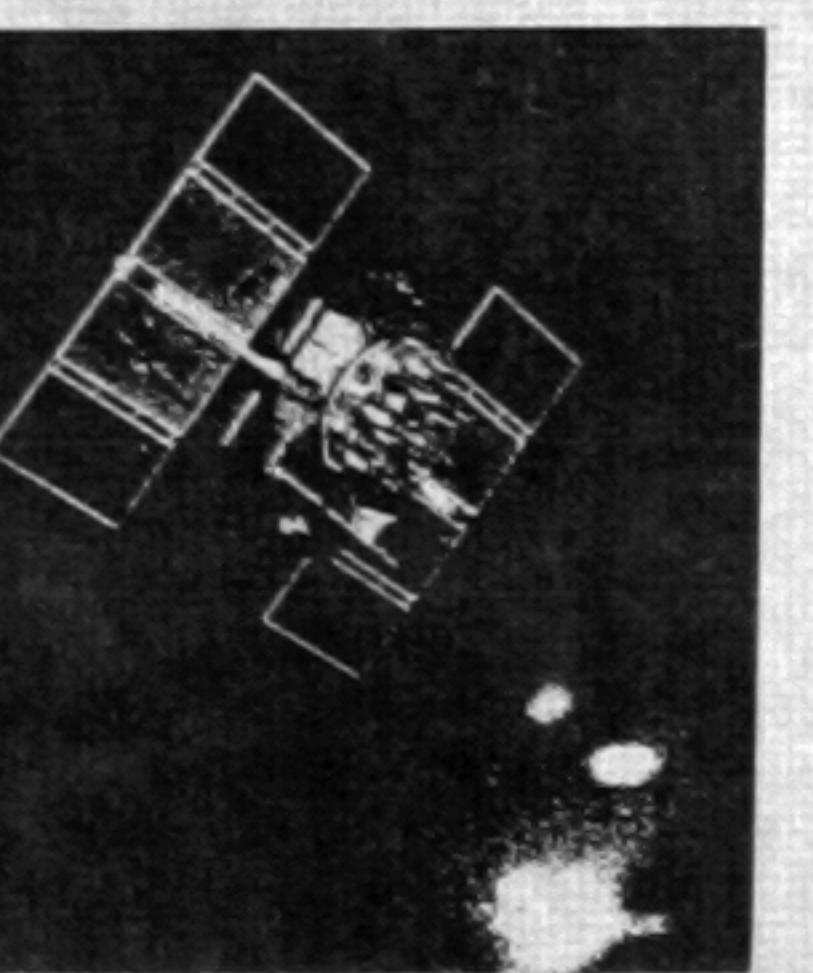
## You Are Here

Information Drift

O. WHERE AM I?  
A. YOU ARE HERE.  
40°5' 43" 17.27" N, 73.5° 58' 49.54" W

That is a specification of this answer can now be provided, to an accuracy of within one centimeter, anywhere on the globe, has become a commonplace of many journalistic accounts of the Global Positioning System. "The GPS," reported The Wall Street Journal recently, "is the most accurate navigation and targeting system ever devised." Or as one manufacturer puts it, "everyone will have the ability to know exactly where they are, all the time."

**You Are Here** makes use of this satellite-based technology to investigate some of the structural complexities of the drive to orient us to position, and to navigate in turn the strange interface between the information space of the digital map and the space it claims to represent. The aim is to analyze the spatial characteristics of the map and its technology, which is to say the architecture of its information, and their effects on the spaces through which the map guides its users. The "here" of a map, and maps always presuppose some sort of orienting



GPS SATELLITES  
Name NAVSTAR  
Manufacturer Rockwell International  
Altitude 10,900 nautical miles  
Weight 1900 lbs (in orbit)  
Size 17 ft with solar panels extended  
Orbital Period 12 hours  
Planned Lifespan 7.5 years  
Number built 11 block I prototypes/satellites  
28 block II production satellites  
Constellation 24 satellites  
COURTESY OF TRIMBLE NAVIGATION

"you are here," is quite another thing from the "here" of the city or the desert, and drifting in the information zone of the map can yield a sharply different experience of space.

How do maps, as information, and the display systems that increasingly make them available, not simply represent but actively construct a space? When "you are here" on a map, through what sort of space do you move, and what sort of movement is possible there? These questions, however abstract, cannot be answered only formally or in principle—they demand examples, maps and information zones themselves, and with them the particular experiences of orientation and dis-orientation possible in data space. "You Are Here" will try to pose some of these questions, to do at least two things at once: challenge the hegemony of the locative drive, and explore the odd transparency and disjunction between earth and data space.

The Global Positioning System depends on a constellation of 24 satellites launched by the Department of Defense, beginning in 1973, at a cost of about \$2 billion. Since it became fully operational this past July, the system enables precise instantaneous positioning in any weather, at any time, and in any location—whether for soldiers in the desert, cruise missiles in flight, or ships at sea. The Navstar satellites, which circle the earth on six orbital paths once every twelve hours, at 20,200 kilometers above its surface, function as something like synthetic stars for any user equipped with a receiver.

Tracked and guided by a ground network of live control and monitoring stations, the satellites constantly broadcast precise position and time signals. The receivers, some of which are small enough to hold in one hand, work like portable antennas or satellite dishes. A GPS receiver which can "see" four of these satellites at once—and the orbital paths are plotted such that, barring obstructions, four satellites are always in view anywhere on earth—can measure the time the signals take to reach it (moving at about a foot per nanosecond) and, by comparing them with the information about the satellite's position, can calculate its own position, latitude, longitude, and elevation.

The position fix is not exact, though. Errors are introduced by the satellite clocks, imperfect orbits, ionospheric and atmospheric disturbances, and the wandering course taken by the signals, and in addition the military intentionally degrades the quality of the signals picked up by non-military receivers. Typically, accuracy of about 100 meters is possible for commercial users, and military receivers reading higher-grade signals can locate themselves to within 10 or 15 meters. Correcting these errors, often in real-time, is known as "differential GPS," and can dramatically improve the readings. When the raw GPS positions

are in turn measured against GPS readings from a known location within sight of the same satellites, the systematic errors in the signals reaching both receivers can be identified, and the position specified with even greater accuracy. "Differential correction" can bring even ordinary commercial receivers to accuracies of within 2 to 5 meters, and civilian users with very sophisticated equipment can correct the measurements of their locations down to centimeters. With a radio link between the remote "rover" location and the reference point, these readings can be made in real-time.

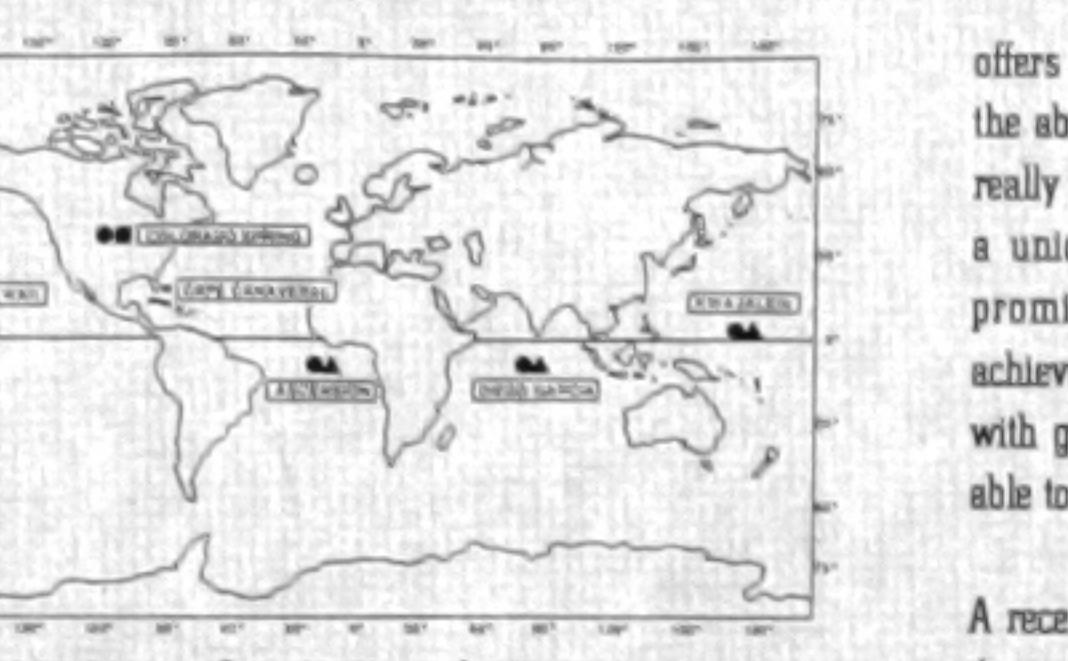
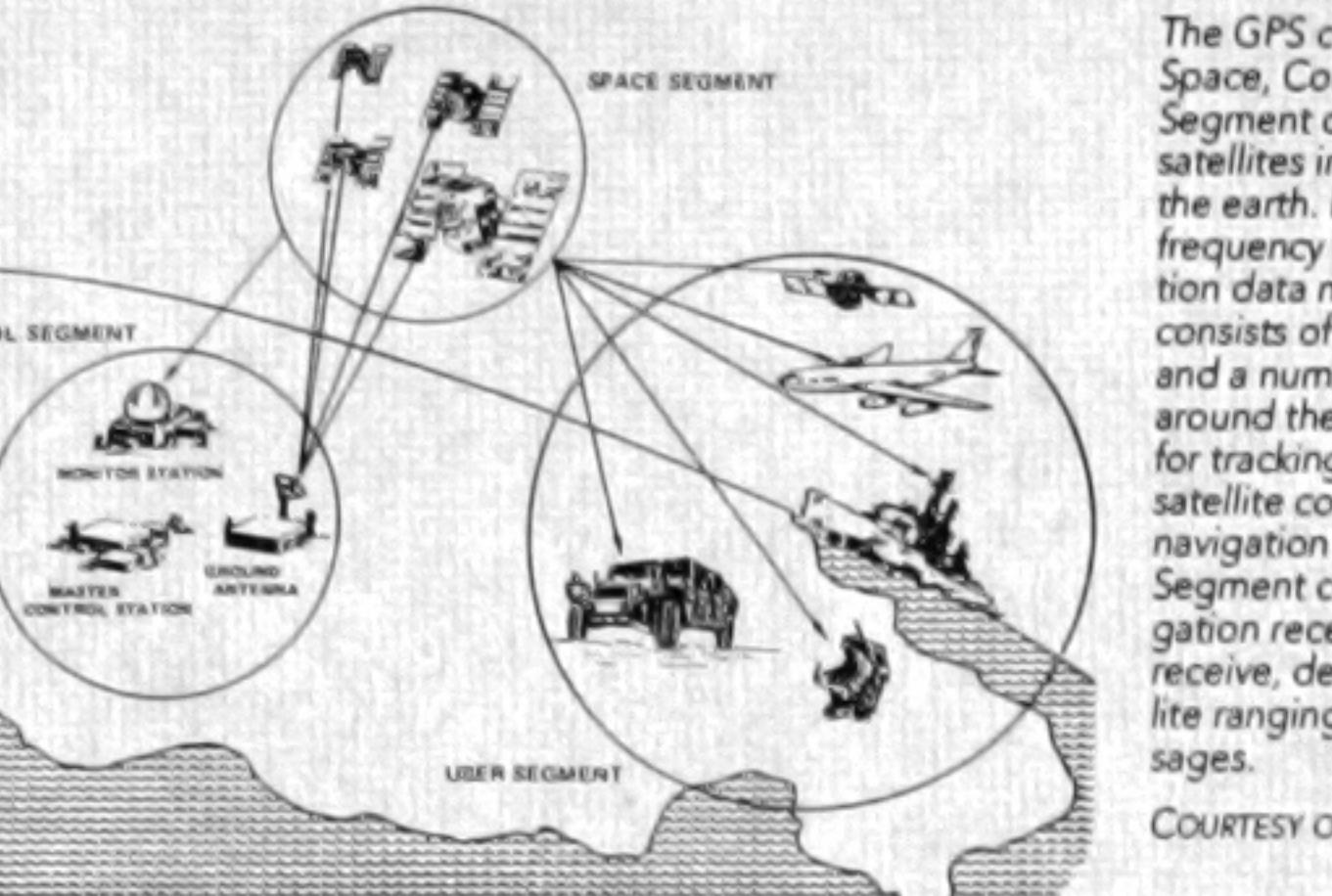
A GPS receiver located, for the duration of the installation, on StoreFront's roof transmits uncorrected real-time position readings to a computer in the gallery, providing a constantly updated feed of the receiver's positioning information. In addition, two different sets of GPS readings have been generated earlier on the roof of StoreFront for Art and Architecture, both recording a line drawn parallel to the storefront of StoreFront: a set of five static points, recorded over the course of an hour on 25 January, and a line walked for a little more than a minute on 14 January. These position readings have been differentially corrected with data downloaded from the New Jersey Department of Environmental Protection and Energy community base station in Trenton, and the readings are accurate within a range of about 5 meters, or 15 feet. The corrected data have been manipulated and interpreted with mapping and analysis software, which translates the position readings into the visual forms and conventions of mapping or architectural drawing. Of course, StoreFront is a small site, and the superimposition of a plan of the building over the GPS map shows that much of the building disappears within its range of error. These positioning data provide the immaterial substance of the installation: real-time readings on display screens, the genealogy of the corrected positions as wall maps, and the readings themselves inscribed on the physical surfaces of the building itself.

The GPS-generated map—of StoreFront or the city, or anywhere, thought not as a network of sites but a network of information—charts a series of drifting pathways across a terrain. GPS location data, always a series of points, require that both movement and stasis be registered as drift in the zone of information, and the map-user operates in an unusually layered, parallel or parallax, space, as if data and earth were at once independent of and somehow transparent to one another. The very elements of architecture—points, lines, and surfaces—all find themselves transformed and redefined in the interactions of this network. The scaleless information zone constitutes not simply the representation of a pre-existing space—as if built or physical space had some ontological or ethical priority—but another space altogether. The possibilities of disorientation, not in the street but precisely in the database that promises orientation, are of an entirely different order, and GPS offers the chance to begin mapping some of these other "highways" as well: drift in the space of information.

The real-time GPS readouts, uncorrected raw positioning data from a receiver located on the roof of StoreFront, are displayed on a modified head-up display (HUD) screen, an imaging device used to project information onto a transparent surface. The difficulty of charting the spaces that chart the spaces, of asking "where am I?" in cyberspace, is to provide an answer that does not simply think about data-space in terms derived from three-dimensional or physical space. Mapping the invisible lines and the scaleless networks of the very system that promises finally to end our disorientation will demand redefining the lines that build the map, and spending time inside the in/finite spaces they generate. We are drawing lines with satellites, not to pinpoint a location but to experience the drift and disorientation at work in any map or any architecture—especially the architecture of information.

The GPS comprises three major segments, Space, Control and User. The Space Segment consists of a constellation of GPS satellites in semi-synchronous orbits around the earth. Each satellite broadcasts radio-frequency (RF) ranging codes and a navigation data message. The Control Segment consists of a Master Control Station (MCS) and a network of monitor stations located around the world. The MCS is responsible for tracking, monitoring, and managing the satellite constellation, and for updating the navigation data messages. The User Segment consists of a variety of radio navigation receivers specifically designed to receive, decode and process the GPS satellite ranging codes and navigation data messages.

COURTESY OF U.S. COAST GUARD



offers new myths of total transparency. "Everyone will have the ability to know exactly where they are, all the time." GPS really allows every square meter of the earth's surface to have a unique address," suggests one manual, while another promises that when real-time centimeter accuracy "is achieved, it will, in a sense, be like carpeting the entire globe with graph paper, because suddenly our instruments will be able to measure any point on earth to that accuracy."

A recent announcement for a GPS software package promises that it can finally deliver a reliable answer to the questions which continue to plague even the users of very powerful maps: "Which pixel am I standing on? or worse, "Where am I?" Not "where am I?" on the earth, but where on the map? At a time when these digital technologies seem to offer great leaps in our ability to locate ourselves—GPS and computerized maps not only in airplanes but in passenger cars and homes: "you'll never get lost again," suggest the ads—and when not only frightened urbanites but some of our most radical social critics are bemoaning our new-found failures in cognitive mapping (Jameson), a critical analysis of new mapping technologies seems imperative. But perhaps the sense of what's "worse," conveyed by the GPS announcement needs to be rethought the older and perennial question of "Where am I?" the question that gives rise both to panic and to new discoveries: has been replaced or displaced by a still stranger interrogative, "Which pixel am I standing on?" What could it mean to stand on a pixel? Who or what stands in or on the data space of a pixel? How can we begin to think the interface between that oldest of human occupations, standing upright, and the new omnipresence of pixelated data and imagery?

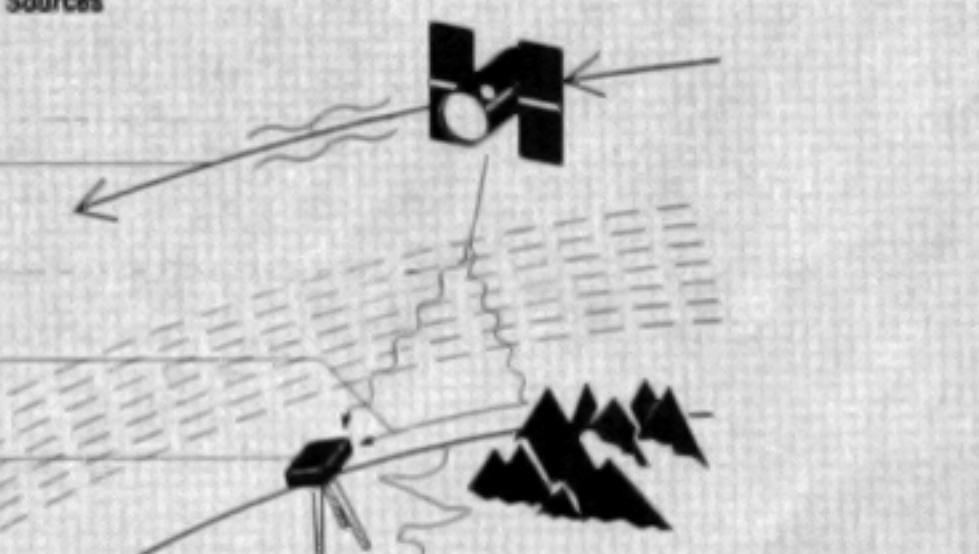
The difficulty of charting the spaces that chart the spaces, of asking "where am I?" in cyberspace, is to provide an answer that does not simply think about data-space in terms derived from three-dimensional or physical space. Mapping the invisible lines and the scaleless networks of the very system that promises finally to end our disorientation will demand redefining the lines that build the map, and spending time inside the in/finite spaces they generate. We are drawing lines with satellites, not to pinpoint a location but to experience the drift and disorientation at work in any map or any architecture—especially the architecture of information.

**Laura Kurgan**

**SPECIAL THANKS TO: SUSAN FIERRO, SCOTT PATTERSON, DARREL PETERSON, KEN SALMAN, JEFF TEITELBAUM, LYNN WATTS AND ALLAN WHITE. AND THANKS TO SERGIO BREGANTE, TOM KEELAN, LINDY ROY, JAMES LUIUR AND BETTINA VISSMAN, FOR THEIR INVALUABLE WORK ON THIS PROJECT.**

COURTESY OF U.S. COAST GUARD

Summary of Error Sources



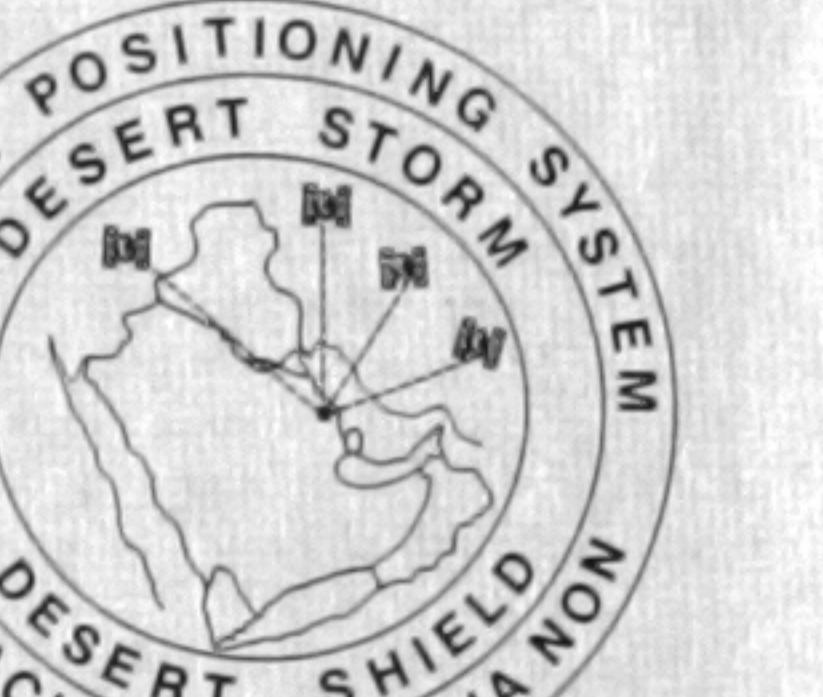
The NAVSTAR GPS played a vital role in the success of the overall operation [DESERT STORM]. The STANDBY LAND ATTACK MISSILE (SLAM) used GPS for mid-course guidance, allowing pilots greater stand-off distance. OTHER AIRCRAFT USED GPS FOR IMPROVED NAVIGATION ACCURACY, TO ENHANCE Emitter SOURCE LOCATION, AND TO PRECISELY LOCATE DOWNED CREW. GPS GAVE OUR FORCES A MAJOR ADVANTAGE OVER THE IRAQIS. IT WAS CRITICAL TO THE ABILITY OF GROUND FORCES TO MORE ACCURATELY CONDUCT MANEUVER (INCLUDING THE END RUN), FIRE SUPPORT, AND LOGISTICAL RE-SUPPLY OPERATIONS OVER THE VAST, FEATURLESS, DESERT TERRAIN. FIELD COMMANDERS HAVE STATED THAT THE VII CORPS SWEEP ACROSS THE WESTERN DESERT WAS NOT EXPECTED BY THE IRAQIS BECAUSE OF THE LACK OF TERRAIN FEATURES AND COULD NOT HAVE BEEN ACCOMPLISHED WITHOUT GPS. GPS ALSO ALLOWED PRECISE MAPPING AND MARKING OF MINEFIELDS BOTH ASHORE AND AT SEA.

OPERATIONS IN THE DESERT CONFIRMED THE VALUE OF GPS NAVIGATION TO INDIVIDUAL TACTICAL UNITS—A REQUIREMENT WHICH HAD TO BE MET WITH RAPID ACQUISITION OF COMMERCIAL UNITS. GPS WAS ALSO SUSCEPTIBLE TO EXPLOITATION, ALTHOUGH THE IRAQIS WERE NOT ABLE TO DO SO. THERE IS A NEED TO CONTINUE TO PRESS TOWARD THE PRODUCTION, DISTRIBUTION, AND INTEGRATION OF GPS RECEIVERS INCORPORATING SELECTIVE AVAILABILITY (SA) DECRYPTION—A FUNCTION THAT ALLOWS DENIAL OF HIGHLY ACCURATE POSITION DATA TO NON-AUTHORIZED USERS—INTO OUR FORCE STRUCTURE. SMALL, MAN-PORTABLE AND VEHICLE-MOUNTED RECEIVERS ARE ESPECIALLY NEEDED BY JOINT AND ALLIED FORCES TO SUCCESSFULLY NAVIGATE IN FEATURLESS TERRAIN AND IN ALL WEATHER CONDITIONS.

FROM U.S. DEPARTMENT OF DEFENSE CONDUCT OF THE PERSIAN GULF WAR AND INTERIM REPORT TO CONGRESS, JULY 1991.

FROM THE PRODUCT BROCHURE OF TRIMBLE NAVIGATION.

THIS PROJECT SEEKS TO ANALYZE OR TO CHART THE CONSTITUTIVE DISTORTIONS UNDERGONE BY SPACE AND TIME IN MAPS AND ESPECIALLY IN NEW DIGITAL MEDIA TECHNOLOGIES. "YOU ARE HERE" OFFERS A CRITICAL ANALYSIS, IN THE FORM OF A RE-MAPPING, OF THE ASSUMPTIONS AND CONVENTIONS OF MAPPING: AN ATTEMPT TO DRAW THE LIMITS OF THE PROJECT OF MAPPING ITSELF, AND AT THE SAME TIME AN EFFORT TO CREATE NEW KINDS OF MAPS AND NEW KINDS OF SPACES BY REWRITING WHAT WE MIGHT CALL THE INVISIBLE LINES THAT MAPS USUALLY OMIT. NOT A MAPPING PROJECT, BUT A RE-MAPPING, A TRANSFORMATIVE CARTOGRAPHY OF THE VERY SPACE OF THE MAP ITSELF, OF THE ARCHITECTURE OF INFORMATION SPACE. —LAURA KURGAN



straight-jacket the civilization to a cultural Det-Con 4.

The infiltration of the military into cultural geography is deeper and more serious than the face value of its products, now shelf-mingling with domestic stuffs. Camouflaged as popular and consumable commodities, wrapped in the banality of post-modern/post-cold-war imagery, they exert subtle reality-fix on weakened, embattled and thirsty zones of civility, safety, dreams, plays, sexuality and other elective elevations of social architecture. It reaches for something beyond the boundary of an average daily life, and begins to kindle our fears and dreams into the flames of technological marvels promising to elevate us from mundane to phenomenal existence.

For instance, later this year, you can download, between your driver-side airbag and CD player, the Navigation/Information System in Oldsmobile's Eighty-Eight LSS for a chickie fee—relative to the Pentium pricing—of \$2,000. Commercializing the Pentagon launched satellites of the Global Positioning System, will also be deployed by Sony Mobile Electronics and Etak Inc. on \$2,500 five-inch color monitors that will display a car's location within a detailed road map that comes with Fodor's travel guides, parks, shops, restaurants, museums and other attractions. For the more proletarian drivers, \$600 gets you City Street by Road Scholar Software.

A tank, jeep, troop transport—if it moves on the ground, we can see it without risking the lives of our ground troops. Joint STARS, a nonintrusive surveillance system, gave battle commanders in Operation Desert Storm a whole new way to look at conflict. It proved to be the most significant system of its kind. Much more than a simple magic box or breakthrough technology, it's the hard won product of nearly 50 years of electronic monitoring research.

## A PICTURE IS WORTH



## A THOUSAND TROOPS.

Pressed into service six years ahead of schedule, Joint STARS is proof that Grumman systems integration—software, hardware, and imaginative thinking—provide real solutions for real problems. Today, the demand for faster, better, and more affordable information is growing. That's a target more elusive than any tank, truck or mobile missile launcher. Fortunately, Grumman has it in its sights. Technologies that make sense today. **GRUMMAN**

ding for plutonium from de-commissioned warheads or other second generation weapons—wanted by the third world nations engaged in cultural, ethnic and religious struggles—marks the banality of military artifacts inside the once critical and counter-military dacha called the artwork. For the final footnote in the domestication of advanced weaponry, let's not forget that the computer in front of you was first developed to guide ballistic missiles and not you.

You Are Here: Information Drift, a site-specific information installation by Laura Kurgan, uses the GPS to digitize StoreFront. Her "drawings with satellites" are intended to display the impact that the system can have on our social and economic lives. The digital mapping, from GPS to GIS (Global Information System), is different and independent, from the traditional sense, for space made of actual monuments and real artifacts. These, built through the drama and events of the wondrous theater called life, in a giant procession called earth, are an accumulation of our historical, cultural and social identities that span millennia. The new space, purely technological and ahistoric, is projected from machines, satellites and their associated instruments, and works instantaneously like a television which can be turned on or off. Of course once it's on, it's won't turn itself off. Like the television, it exists simultaneously with the real stories, and will impose itself over our historic and static spaces.

The danger of GPS is its ability to reconfigure the world. From beyond our reaches and sight this set of artificial stars, that replaces the real stars, generates the first revolution in atomic mapping since Copernicus. The new universal space, based on the principle of relativity, systematically reduces all concrete points on earth to a set of reference points. The monuments and cities that historically marked our space and history, become inconsequential for the spatiality that demands only longitude, latitude and elevation. With the satellites turning earth into a digital ground, historical spaces become transparent under the space built on pixels instead of mortars. Capable of finding and orienting you at anywhere and anytime, the technology grants us the freedom to become lost for all time. Our gradual tendency toward nomadism is exalted, psychological or biotic, released from the panoramic mapping of our world in the cartography of western and colonial vision—from the real estate of life and space.

In this context, Kurgan's **You Are Here: Information Drift** is about an access to the technology that can control us. As GPS download from the military to the corporate, those who are denied it are those who will be controlled. A modern is the risk to this first nation called information, "flaming" all geo-political boundaries—a post-modern piracy of goods and knowledge.

On a recent ad from the Grumman Corporation, which appeared on the op-ed page of the New York Times, reads "A Picture is Worth a Thousand Troops." Will the Information Superhighway of Clinton/Gore become the Highway of Death for citizens like me?

Kyong Park

